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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Christopher M. Bishop

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MICROSOFT CORPORATION

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EXAMINER

SILVER, DAVID

ART UNIT

PAPER NUMBER

2128

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/724,586	Applicant(s) BISHOP ET AL.	
	Examiner David Silver	Art Unit 2128	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 May 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-70 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-70 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 November 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Claims 1-70 are pending in Instant Application.

Information Disclosure Statement / Duty to Disclose

2. During the Examination of the Instant Application, a document (titled "Robust Bayesian Mixture Modelling") authored by the Instant Application's Inventors was discovered. The document, written by the Instant Application's inventors, contains numerous references that were not submitted to the Office for consideration in a corresponding IDS form. Some of the references used in the document were authored by at least one of the Instant Application's inventors. Unless cited in a PTO-892 form, the documents were not considered.

Full faith and credit is extended to Applicants that they have complied with their duty to disclose. See 37 CFR 1.56.

Drawings

3. Figure 1 and 4 should be designated as --Prior Art-- because only that which is old is illustrated (distribution curves and a computer system, respectively). See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

4. Claims 1-70 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.
- 4.1 The method claims do not produce a useful, tangible, and concrete **result**. The steps of the method

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claims do not produce a useful, tangible, and concrete result. They merely recite a software algorithm, *per se*, which, for example, does not display, store, or otherwise provide a useful tangible output. Note exemplary claim 1 which only recites software steps and **does not produce a useful tangible and concrete result**.

4.2 Absent an explicit and deliberate definition in the specification that the product includes an appropriate medium or hardware elements, the claims are directed to software *per se*. Note exemplary claim 27, which recites only software elements. Additionally, software, *per se*, is not considered concrete under the above-recited MPEP citation (MPEP 2106).

All of the claims amount, at best, to abstract ideas. See MPEP 2105 [R-1], "The laws of nature, physical phenomena and *abstract ideas*" are not patentable subject matter."

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 7, 20, 32, 45, 56, and 66 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the **enablement requirement**. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

5.1 As per claim 7, 20, 32, 45, 56, and 66, the Specification fails to comply with the written description requirement because it does not adequately convey to one of ordinary skill in the art that Applicant has possession of the claimed invention at the time of filing. Specifically, the Specification does not properly disclose "labeling parameter". What is a "labeling parameter"? How is this parameter used? In order to further prosecution, the term is interpreted as "variable".

5.2 As per claims 12, 25, and 37, the claims fail to enable "determining a correct number of speakers

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from the probability density modeling the input set of data". Specifically, how is this determination performed? What are the steps in performing this limitation? These deficiencies are merely exemplary.

5.3 As per claims 13, 26, and 38, the claims fail to enable "input set of data represents image segmentation data from images having regions of different characteristics". What are "different characteristics"? How are the images represented? What is image segmentation data? These deficiencies are merely exemplary.

6. Claims 1-70 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the **written description requirement**. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

6.1 As per claims 1-70, the Specification does not explain what makes an approximation "tractable". How is a "tractable" approximation performed? Furthermore, the Specification does not define what makes an approximation tractable.

6.2 As per claim 7, 20, 32, 45, 56, and 66, the Specification fails to comply with the written description requirement because it does not adequately convey to one of ordinary skill in the art that Applicant has possession of the claimed invention at the time of filing. Specifically, the Specification does not properly disclose "labeling parameter". What is a "labeling parameter"? How is this parameter used?

6.3 As per claim 12, 25, 37, the Specification fails to comply with the written description requirement because it does not reasonably disclose in accordance with 35 USC 112 first paragraph: "determining a correct number of speakers from the probability density modeling the input set of data". Specifically, the Specification does not disclose how this is determination performed. Furthermore, what are the steps in performing this limitation?

6.4 As per claims 13, 26, and 38, the Specification fails to comply with the written description requirement because it does not reasonably disclose in accordance with 35 USC 112 first paragraph "input set of data represents image segmentation data from images having regions of different

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characteristics". What are "different characteristics"? How are the images represented? What is image segmentation data? These deficiencies are merely exemplary.

As per claim rejections 12, 25, 37, and 13, 26, and 38 *supra*, paragraph [0067] of the Instant Application's Specification is the only paragraph that appears to be drawn to the limitations of the Instant Claims. The paragraph however does not provide sufficient written description to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The paragraph merely mentions a vague possibility of such image and sound processing without providing support.

7. Claims 1-70 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted steps are: establishing a result. What is the result of performing the method, or the claimed system performing its method?
8. Claims 1-70 are rejected under 35 U.S.C. 112, second paragraph, as being **indefinite** for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The term "satisfactorily optimized" in claims 1, 2, 14, 15, 27, 39, 40, 41, 50, 51, 52, and 61 is a relative term that renders the claim indefinite. The term "satisfactorily optimized" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

9. As per claims 1-70, the term "tractable" is defined as:

tractable adj. 1. Easily managed or controlled; governable. 2. Easily handled or worked; malleable. (Source: <http://www.answers.com/tractable&r=67>).

The term is relative and ambiguous. The term renders the claim indefinite.

10. Claims 1-70 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted steps are: optimization. Specifically, the claims recite "if the lower bound is (not) satisfactorily optimized"; however, optimization is missing from the claims.

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11. The above cited rejections are merely exemplary.
12. The Applicant(s) are respectfully requested to correct all similar errors.
13. Claims not specifically mentioned are rejected by virtue of their dependency.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

14. Claims 1-11, 14-24, 27-36, and 39-70 are rejected under 35 U.S.C. 102(b) as being anticipated by Heckerman (**US 5,704,018**).

Heckerman discloses: 1. A method comprising:

selecting a modeling parameter from a plurality of modeling parameters characterizing a mixture of Student distribution components (**col: 7 line: 42-56; student distribution ... col: 16 line: 6-37 (emphasis on 34-37)**);

computing a tractable approximation of a posterior distribution for the selected modeling parameter based on an input set of data and a current estimate of a posterior distribution of at least one unselected modeling parameter in the plurality of modeling parameters (**col: 7 line: 14-27; col: 8 line: 43-49; col: 10 line: 57-67**);

computing a lower bound of a log marginal likelihood as a function of current estimates of the posterior distributions of the modeling parameters, the current estimates of the posterior distributions of the modeling parameters including the computed tractable approximation of the posterior distribution of the selected modeling parameter (**col: 11 line: 12-17; col: 10 line: 5-30**); and

generating a probability density modeling the input set of data, the probability density including the mixture of Student distribution components, the mixture of Student distribution components being characterized by the current estimates of the posterior distributions of the modeling parameters, if the lower bound is satisfactorily optimized (**col: 2 line: 5-23; col: 7 line: 14-**

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27).

Heckerman discloses: 2. The method of claim 1 wherein the computing operations comprise a first iteration and further comprising:

selecting a different modeling parameter from the plurality of modeling parameters and repeating in a subsequent iteration the operations of computing a tractable approximation and computing a lower bound using the newly selected modeling parameter, if the lower bound is not satisfactorily optimized in the first iteration(**col: 6 line: 32-56 with emphasis on line: 36-51**).

Heckerman discloses: 3. The method of claim 1 wherein computing a lower bound comprises:

computing the lower bound of the log marginal likelihood as a function of prior distributions of the modeling parameters (**col: 4 line: 39-56; Fig 4, 5, 6 and descriptions; col: 5 line: 33-51**).

Heckerman discloses: 4. The method of claim 1 wherein computing a tractable approximation of a posterior distribution comprises:

computing a variational approximation of the posterior distribution of the selected modeling parameter (**col: 13 line: 30-65 with emphasis on 45-56**).

Heckerman discloses: 5. The method of claim 1 wherein one of the plurality of modeling parameters represents a mean of each of the Student distribution components (**col: 7 line: 65-67 "average"; col: 10 line: 48-49; col: 7 line: 56-65**).

Heckerman discloses: 6. The method of claim 1 wherein one of the plurality of modeling parameters represents a precision matrix of the Student distribution components (**col: 13 line: 65 to col: 14 line: 25; Fig 9A and 9B and their descriptions; col: 14 line: 26-64**).

Heckerman discloses: 7. The method of claim 1 wherein one of the plurality of modeling parameters represents a labeling parameter of the Student distribution components (**In view of the 35 USC 112 first paragraph rejections above and the subsequent interpretation, this feature is inherent in the cited reference.**).

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Heckerman discloses: 8. The method of claim 1 wherein one of the plurality of modeling parameters represents a scaling parameter of a precision matrix of the Student distribution components (**col: 18 line: 31-49 scaling parameter ... "weights"**).

Heckerman discloses: 9. The method of claim 1 wherein one of the plurality of modeling parameters represents a mixing coefficients parameter of the Student distribution components (**col: 16 line: 58 to col: 17 line: 2; col: 16 line: 47-56; col: 7 line: 1-20**).

Heckerman discloses: 10. The method of claim 1 wherein generating a probability density comprises:
generating the probability density including the mixture of Student distribution components, the mixture of Student distribution components being characterized by the current estimates of the posterior distributions of the modeling parameters and an estimate of the number of degrees of freedom of each Student distribution component (**this is an inherent features of the cited reference's distribution**).

Heckerman discloses: 11. The method of claim 1 further comprising:

storing the current estimates of the posterior distributions of the modeling parameters in a storage location (**Fig 8B item 820; Fig 6 and its description**).

As per claims 14-24, 27-36, and 39-70, note the rejection of claims 1-11 above. The Instant Claims recite substantially same limitations as the above-rejected claims and therefore rejected under same prior-art teachings.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

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15. Claims 12-13, 25-26, and 37-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Heckerman (**US 5,704,018**) as applied to claim 1 above, and further in view of Official Notice taken. As per claim 12, Heckerman discloses all limitations of claim 1. Heckerman however does not expressly disclose that the input set of data represents auditory speech data from an unknown number of speakers, and further comprising determining a correct number of speakers from the probability density modeling the input set of data. Official Notice is taken with respect to this limitation. It would have been obvious to one of ordinary skill in the art <digital signal processing / statistical analysis> at the time of Applicant's invention to combine the references in order to apply the features taught by Heckerman in order to use them on digital signal processing systems such as sound or image processing in order to *efficiently and quickly process the digital signals*. Furthermore, having knowledge of the number of speakers is useful in speech recognition. One would be motivated to know the number of speakers in a conference in order to transcribe the presentations and feedback questions through computer automated methods. See, for example, Rajan (**US 20020055913 A1**).

As per claim 13, Heckerman discloses all limitations of claim 1. Heckerman however does not expressly disclose that the input set of data represents image segmentation data from images having regions of different characteristics. Official Notice is taken with respect to this limitation. It would have been obvious to one of ordinary skill in the art <digital signal processing / statistical analysis> at the time of Applicant's invention to combine the references in order to apply the features taught by Heckerman in order to use them on digital signal processing systems such as sound or image processing in order to efficiently and quickly process the digital signals.

As per claims 25-26, note the rejection of claims 12-13 above. The Instant Claims recite(s) substantially same limitations as the above-rejected claims and therefore rejected under same prior-art teachings.

As per claims 37-38, note the rejection of claims 12-13 above. The Instant Claims recite(s) substantially same limitations as the above-rejected claims and therefore rejected under same prior-art teachings.

Examiner Requests

16. The Examiner respectfully requests, in the event the Applicants choose to amend or add new claims,

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that such claims and their limitations be directly mapped to the specification, which provides support for the subject matter. This will assist in expediting compact prosecution.

Conclusion

17. All claims are rejected.

18. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David Silver whose telephone number is (571) 272-8634. The examiner can normally be reached on Monday thru Friday, 10am to 6:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamini Shah can be reached on 571-272-2279. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

David Silver
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